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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/055,256	01/22/2002	Anders Dale	HGS-004	6746

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ONE POST OFFICE SQUARE
BOSTON, MA 02109-2127

EXAMINER

ROY, BAISAKHI

ART UNIT	PAPER NUMBER
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3737

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

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Office Action Summary	Application No.	Applicant(s)	
	10/055,256	DALE ET AL.	
	Examiner	Art Unit	
	Baisakhi Roy	3737	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 November 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 46-48, 50-52, 55-57, 69-74, 76-82, 84-89 and 92-101 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 46-48, 50-52, 55-57, 69-74, 76-82, 84-89, and 92-101 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 46-48, 50-52, 55-57, 69-74, 76-82, 84-89, and 92-101 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 46-48, 50, 51, 69-74, 76-82, 84-89, and 92-101 are rejected under 35 U.S.C. 102(b) as being anticipated by Miller et al. (Mathematical textbook of deformable neuroanatomies, Proceedings of the National Academy of Sciences USA, 90:11944-11948 (1993). The Miller et al. article describes a procedure in which an elastic model of the brain anatomy is driven by data-overlap probabilities to warp brain atlas images onto MRI slice or section images. In this case, segmentation occurs by associating the image voxels with atlas tissue-type labels (abstract). Miller et al. teach generating an MR based anatomic template or atlas from subjects with symbolic information that includes various labeled areas or tissue types such as white-matter, gray-matter, and other areas (page 11945, col. 1, paragraph 3). The MRI based atlas includes a plurality of nodes corresponding to a plurality of voxels representing spatial

locations of a subject, each of the nodes configured to store at least two magnetic property values such as T1 and T2 values for each of the voxels, where the magnetic property values correspond to tissue type at one of more voxels (page 11947, col. 1, paragraph 3-5). Miller et al. also teach determining statistical representation values including the mean and variance of intensities of each of a plurality of magnetic property values at each corresponding voxel of the plurality of subjects (page 11945, col. 2, paragraph 5 – page 11946, col. 1). The template or atlas is applied to an individual patient or aligned with subsequent MR scans of the individual patient using algorithms for specifying the global anatomical relationships between structures and how they can vary from one individual to another (page 11945, col. 2, paragraphs 2-3). Figure 3 in Miller et al. show the alignment of the patient scan to the global atlas and further in figure 5 showing the global and local flow of information as the t2 component of the atlas aligns with patient A scan. Miller et al. further teach carrying out further transformations from the coordinate system of the global template to the studies of patients A and B and then automatically mapping labeled symbolic information to the patient's coordinate system. This is demonstrated in figure 6, where the automatically labeled gray-matter nuclei and ventricle information in the atlas is applied to the brains of patients A and B.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 52 and 55-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al. in view of Stodilka et al. (6740883).

The Miller et al. article describes a procedure in which an elastic model of the brain anatomy is driven by data-overlap probabilities to warp brain atlas images onto MRI slice or section images. In this case, segmentation occurs by associating the image voxels with atlas tissue-type labels (abstract). Miller et al. teach generating an MR based anatomic template or atlas from subjects with symbolic information that includes various labeled areas or tissue types such as white-matter, gray-matter, and other areas (page 11945, col. 1, paragraph 3). The MRI based atlas includes a plurality of nodes corresponding to a plurality of voxels representing spatial locations of a subject, each of the nodes configured to store at least two magnetic property values such as T1 and T2 values for each of the voxels, where the magnetic property values correspond to tissue type at one of more voxels (page 11947, col. 1, paragraph 3-5). Miller et al. also teach determining statistical representation values including the mean and variance of intensities of each of a plurality of magnetic property values at each corresponding voxel of the plurality of subjects (page 11945, col. 2, paragraph 5 – page 11946, col. 1). The template or atlas is applied to an individual patient or aligned with subsequent MR scans of the individual patient using algorithms for specifying the global anatomical relationships between structures and how they can vary from one individual to another (page 11945, col. 2, paragraphs 2-3). Figure 3 in Miller et al. show the alignment of the patient scan to the global atlas and further in figure 5

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showing the global and local flow of information as the t2 component of the atlas aligns with patient A scan. Miller et al. further teach carrying out further transformations from the coordinate system of the global template to the studies of patients A and B and then automatically mapping labeled symbolic information to the patient's coordinate system. This is demonstrated in figure 6, where the automatically labeled gray-matter nuclei and ventricle information in the atlas is applied to the brains of patients A and B.

Miller et al. do not explicitly teach the steps of correcting distortion during the registration process. In the same field of endeavor Stodilka et al. disclose a system and method for creating a MRI based atlas constructed by amalgamating a plurality of patient scans (col. 6 lines 60-68), and then aligning subsequent scans to the atlas while correcting distortion which may include shifting, rotation, scaling, and/or non-linear operations (col. 7 lines 7-10). It would have therefore been obvious to one of ordinary skill in the art to use the teaching by Stodilka et al. to modify the teaching by Miller et al. for the purpose of providing a better degree of registration (col. 7 lines 39-42).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO 892 for relevant references of interest.

2003/0011624 - Ellis discloses a method for obtaining information about a subject by providing a MRI based atlas having magnetic property values derived from many volunteer subjects involving data derived from a plurality of subjects [0098, 0119]. The method involves processing the information, reading the atlas, and determining

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alignment of the magnetic resonance scan to obtain a specific geometry of a subsequent magnetic resonance scan [0098, 0119].

2001/0036302 – method and apparatus for cross modality image registration.

6,374,130 – method of performing a sequence of emission scans to obtain PET images of the brains of the test subjects, then using mathematical algorithms to align the sequential PET images, deform the images into the coordinates of a standard brain atlas, normalize the PET data, and generate statistical parametric maps of significant changes in brain activity among the test subject.

5,602,891 – imaging apparatus and method with compensation for object motion.

3. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Baisakhi Roy whose telephone number is 571-272-7139. The examiner can normally be reached on M-F (7:30 a.m. - 4p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian L. Casler can be reached on 571-272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BR

BR


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